Application Note

Application Note

Document No.: AN1086

APM32F4xx_ISP Application Note

Version: V1.0

1   Introduction

This application note provides how to use the graphical interface programs Geehy-ISP MultiPort Programmer and Geehy-DFU Programmer for ISP online upgrade of firmware on APM32F4xx series.

Geehy-ISP MultiPort Programmer application program is used to perform reading, writing, erasing and other operations on single or multiple MCU devices, based on USART communication protocol.

Geehy-DFU Programmer application program is used to perform reading, writing, erasing and other operations on a single MCU device, based on USB communication protocol.

All application programs involved in this application note can be obtained and downloaded from the website of www.geehy.com.

Contents

2   ISP MultiPort Programmer

ISP is In-System-Programming. Chips with ISP function can write or erase programs directly on the circuit board through a simple download cable, can be rewritten by the software of the upper computer through the serial port, and supports online debugging. So that users can test and develop the chips without programmers. This brief summary will use APM32F407IGMINIBOARD to demonstrate the application function of Geehy-ISP MultiPort Programmer.

2.1   Environmental requirements

2.1.1   Software requirements

Support of Windows XP, Windows7 and above operating system is required.

Support of .net Framework4.0 is required.

2.1.2   Hardware requirements

Available serial communication port (COM).

When connecting multiple devices at the same time, please use the data cable, USB Hub and USB-to-serial port device which can ensure stable transmission.

When connecting multiple devices, please select the appropriate number of devices according to the actual configuration of the PC.

2.2 Hardware connection

2.2.1 Connection method

Geehy-ISP Multiport Programmer supports the operation of connecting one device and connecting multiple devices at the same time. The equipment is connected as follows:

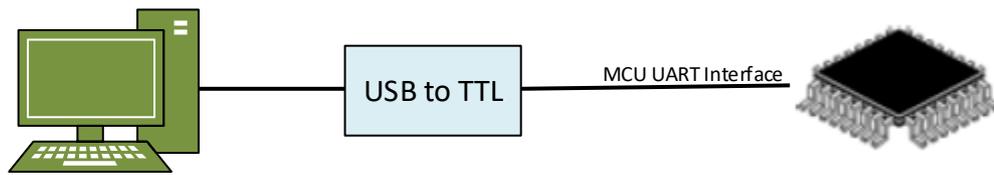1） UART connects to one device, as shown in the following figure:

Figure 1 Method of Connecting One Device

2） UART connects to multiple devices at the same time, as shown in the figure below:
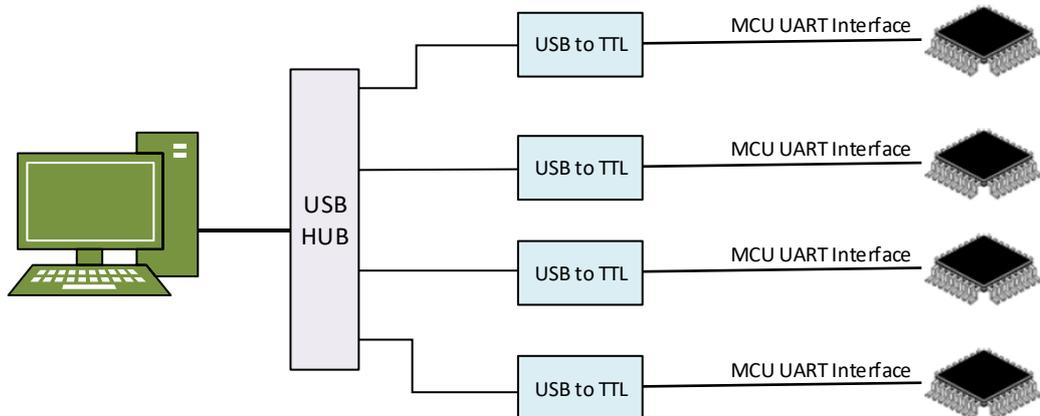
Figure 2 Method of Connecting Multiple Devices

2.2.2　Boot mode

APM32F4xx series provides three boot modes, which can be selected by users through the BOOT pin. The pin status will be latched on the rising edge of the fourth system clock after reset. Select the system memory to boot when using ISP.

BOOT1	BOOT0	Boot mode
X	0	Main FLASH memory
0	1	System memory
1	1	SRAM

2.2.3　Communication interface

The user realizes communication and connection through USART1 pin.

Serial port	TX Pin (transmit)	RX Pin (receive)
USART1	PA9	PA10

2.3   Device operation

2.3.1   Main interface

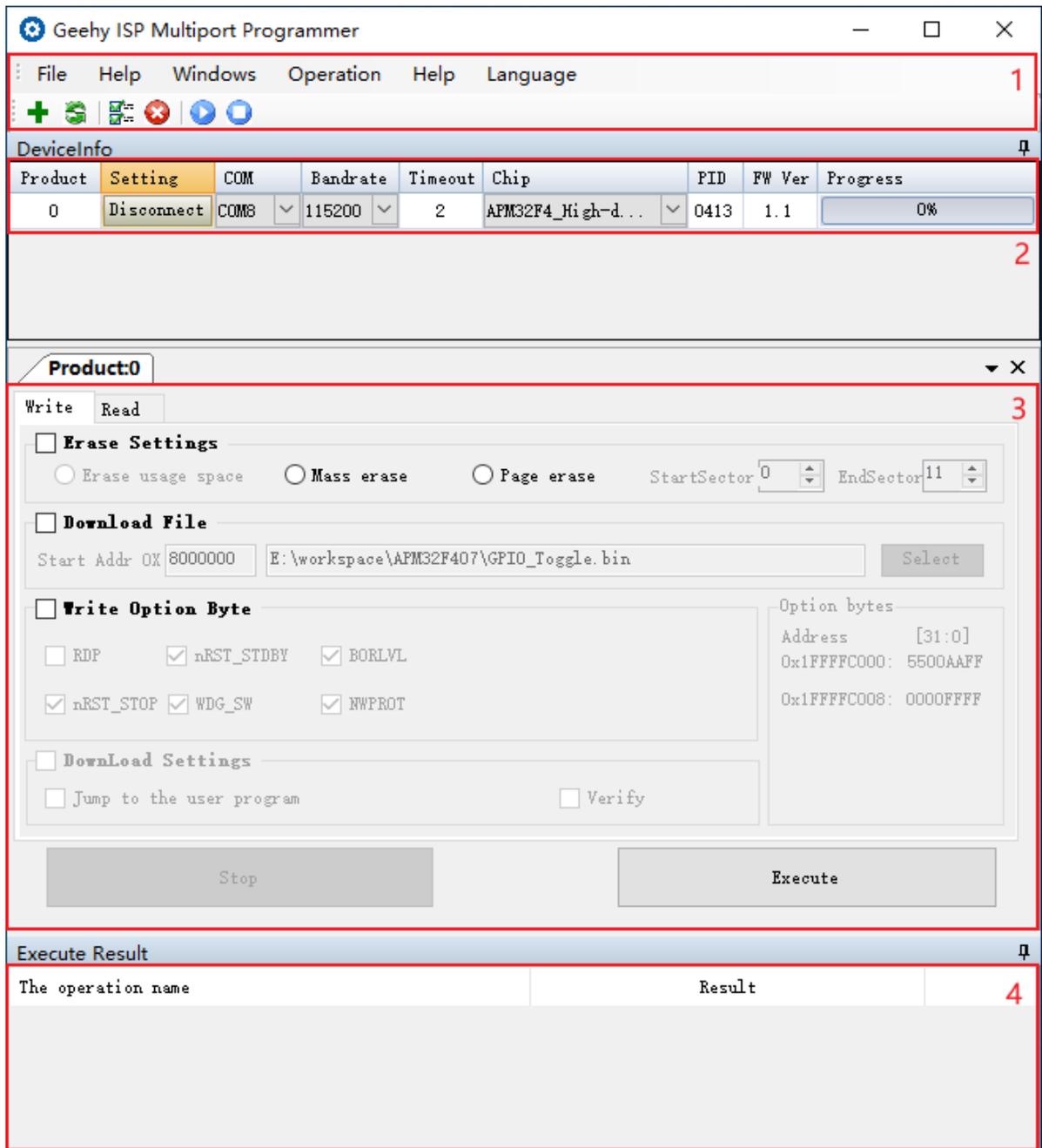The main interface of Geehy-ISP Multi_Port Programmer is divided into four parts, as shown in the following figure:

Figure 3 Main Interface

1. **Menu bar and toolbar:**

    1)   The functions of the menu bar are as follows:

    File: contains "Exit", and its function is to exit the program.

    View: contains "Toolbar", and its function is to show / hide the toolbar.

    Window: contains "New window", "Refresh serial port" and "Close all",

    Their functions are to create a new device operation window, refresh the device connection serial port, and close all device operation windows respectively.

    Operation: contains "Connect all", "Disconnect all", "Execute all" and "Abort all"

    Their functions are to connect / disconnect all devices and run / stop all devices respectively.

    Help: contains "Instructions for use" and "About". Their functions are to open the manual and view the software information respectively.

    Language selection: contains "English" and "Chinese", and its function is to switch the interface language.

    2)   The functions of the buttons in the toolbar are: "New window", "Refresh serial port", "Connect all", "Disconnect all", "Execute all" and "Abort all" respectively.

2. **Device control information display area:** This area is used to set the device connection configuration and device information display.

3. **Device operation configuration area:** This area is used to set some operation configurations for the device.

4. **Operation result display area:** This area displays the execution of device operation.

2.3.2　Device connection

1）Click "New window" button to create a new operation window.

2）Select serial port number and baud rate. The minimum baud rate is 1200 bit/s, and the maximum baud rate is 115200 bit/s; set the timeout (1≦ timeout≦ 10) in "s".

3）Connect: Reset MCU; click "Connect" to open the serial port and complete handshake with MCU. After handshaking successfully, the MCU information obtained is as follows:
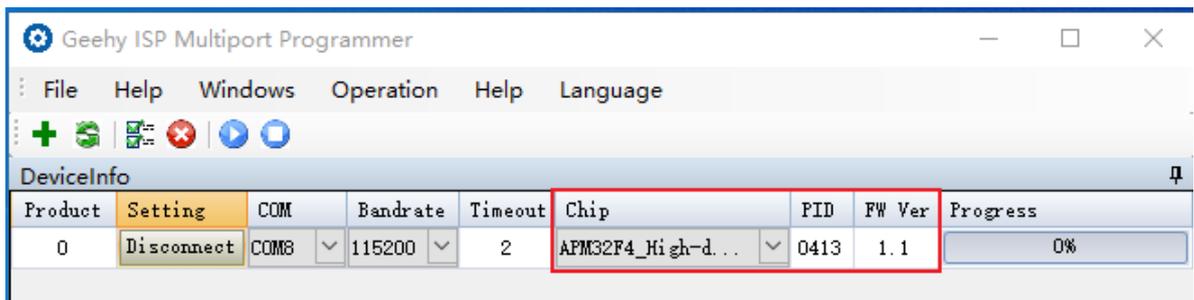

Figure 4 Chip Reading

4）If the handshake with MCU fails, the following prompt will appear:
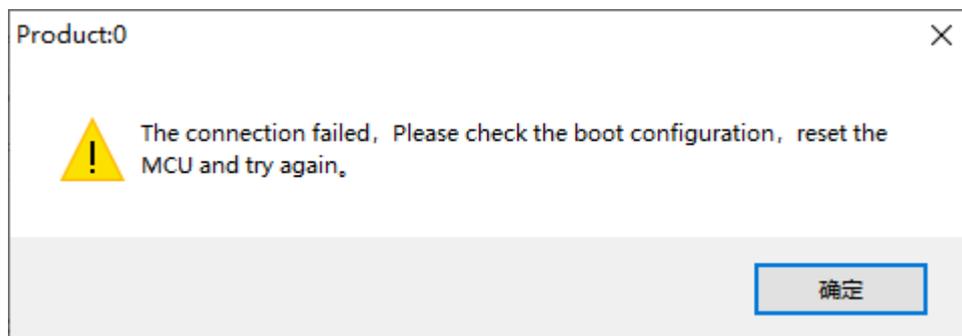
Figure5 Connection Failure Prompt

2.4 Function operation

2.4.1 Erase operation

1） Erase all space
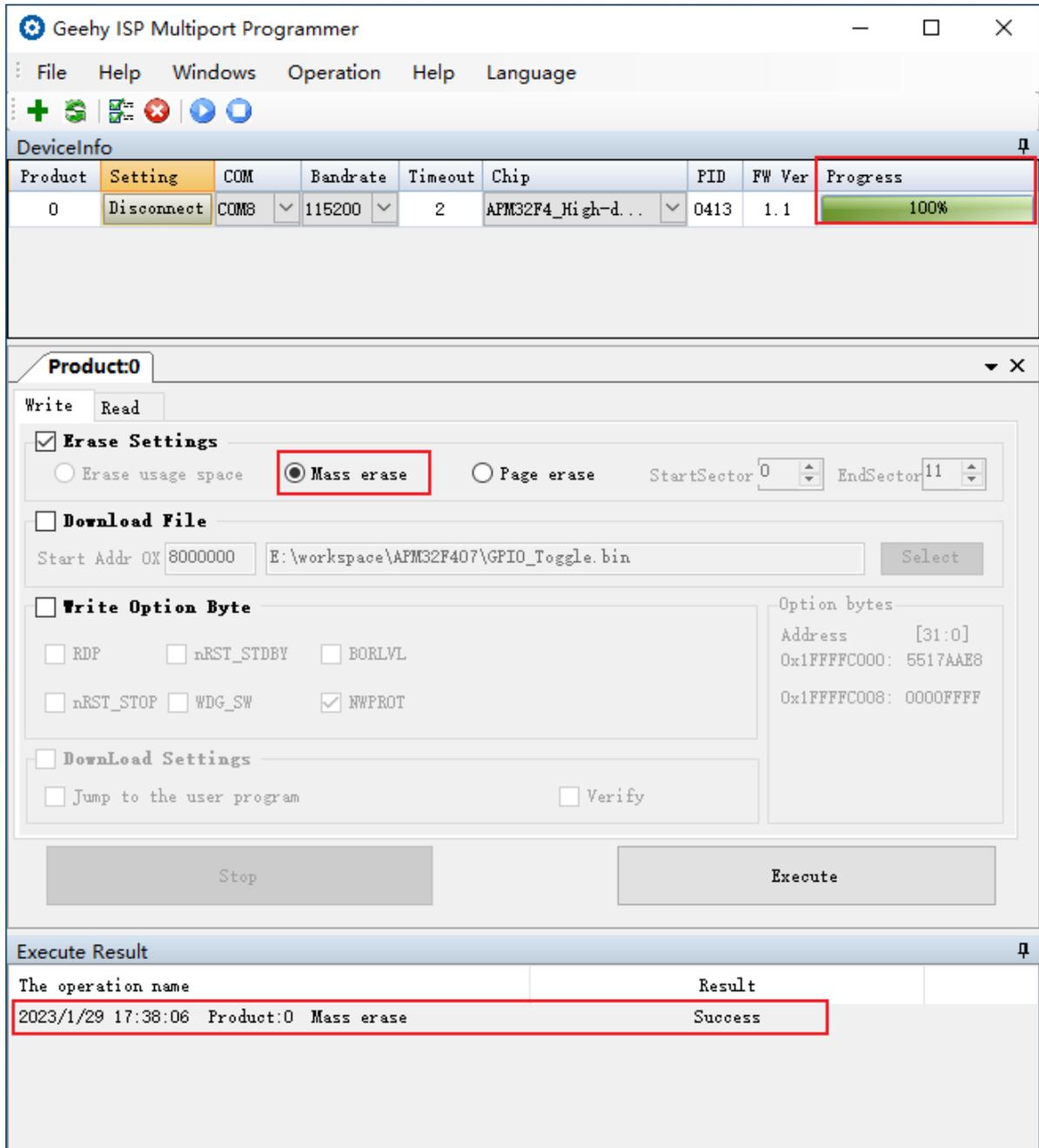
Figure 6 Erase All Space

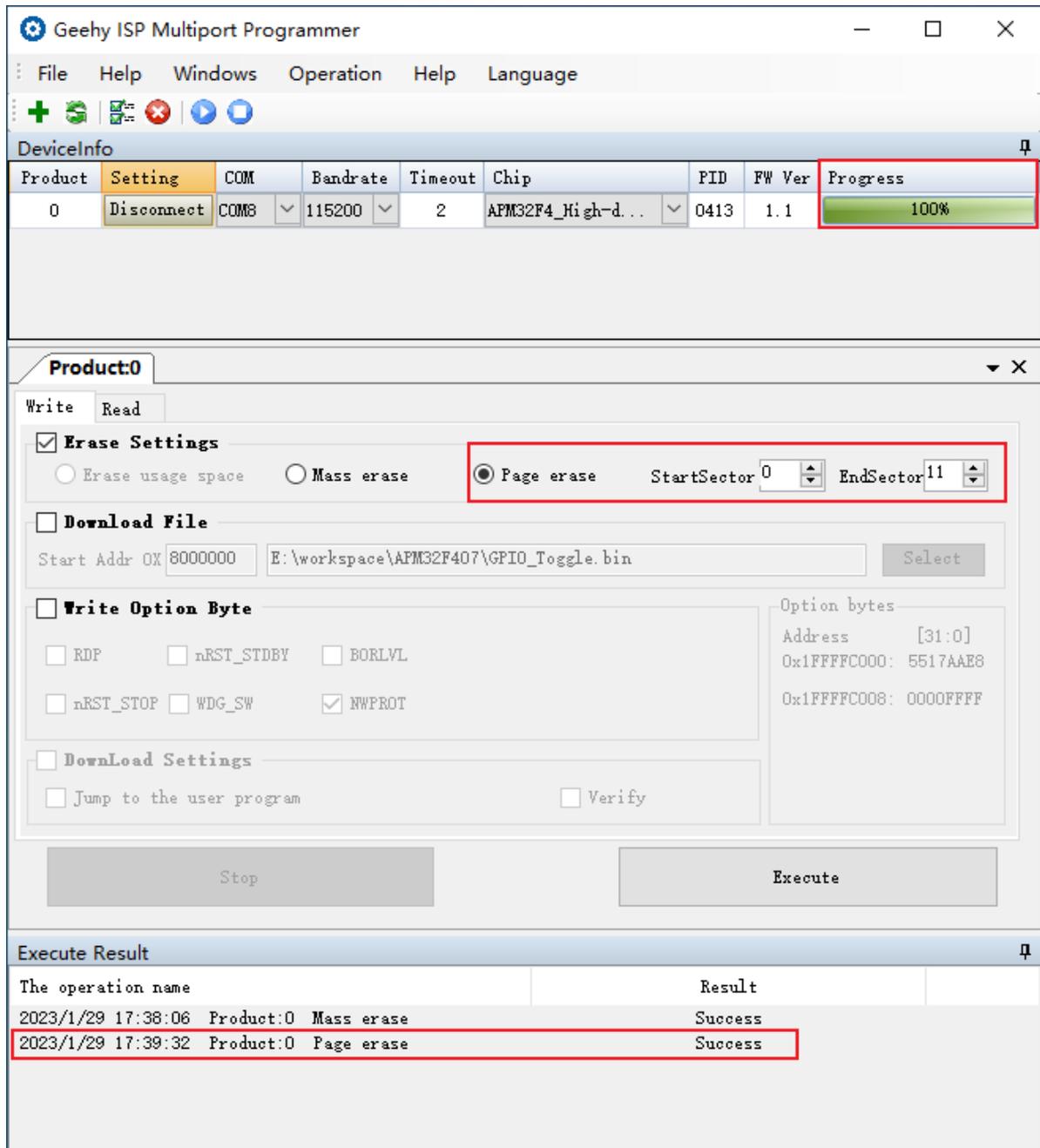2）Erase specified space: Set the start page and end page to be erased

Figure 7 Erase Specified Space

2.4.2 Write option byte

1）After selecting "Write option byte", the current option type configuration of MCU will be obtained,
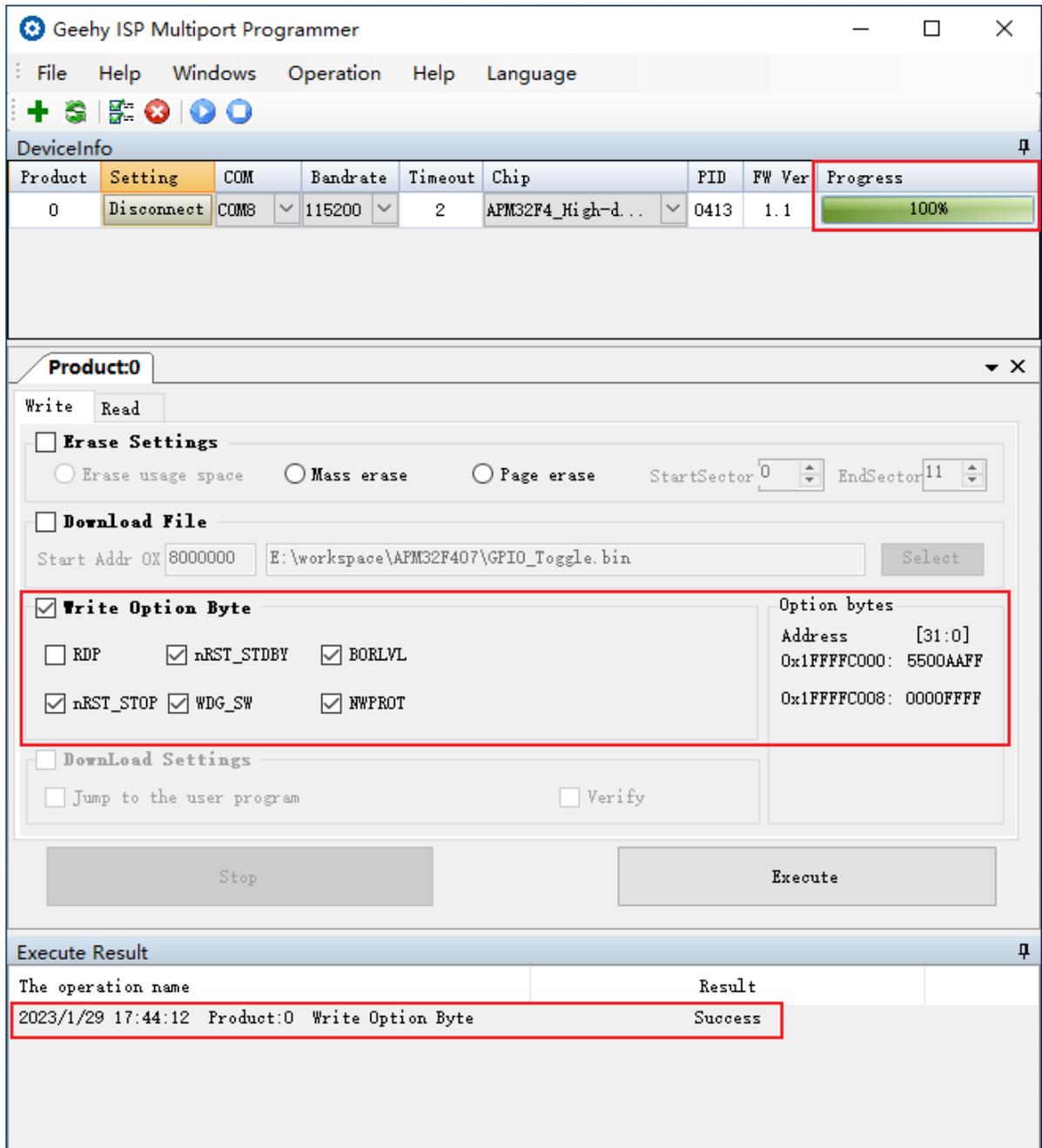
as shown in the figure:
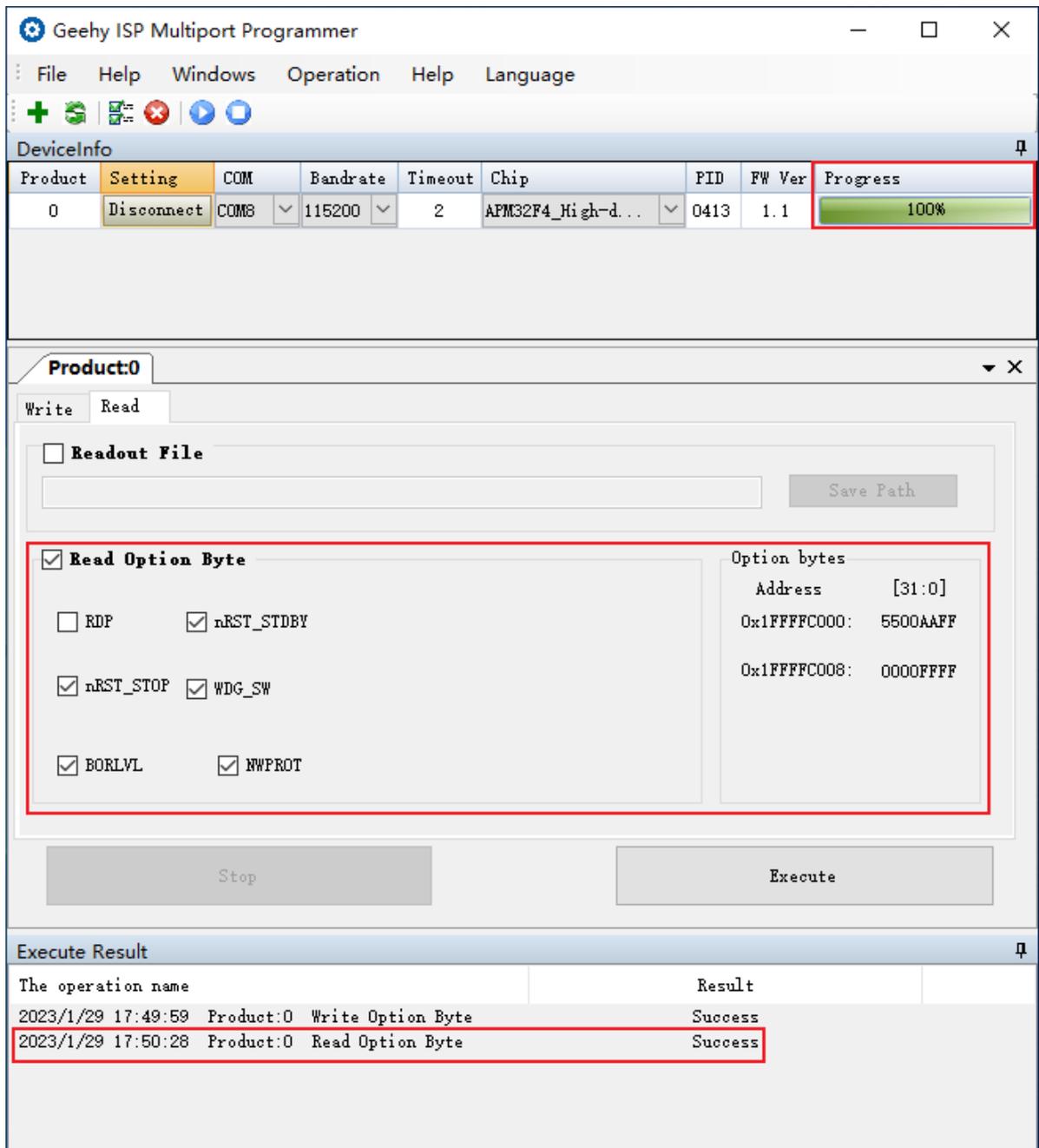

Figure 8 Write Option Byte

2.4.3 Read option byte

Figure 9 Read Option Byte

2.4.4 Write to file

After selecting "Write to file", you can also select the followings:

➢ Erase method: Select "Erase use space" or "Erase all space".

➢ Post-write operation: "Verify after download" means that, after all file data are written to MCU, read the MCU data of the same length from the start address for data check, and judge whether the data written to MCU are correct; "Execute program after download" starts the program written to MCU.

➢ Note: When the file suffix is ".hex", the start address cannot be edited.

➢ Note: After starting the program written to MCU, the communication between the upper computer and the system memory bootloader will be lost, and the MCU needs to be reconnected.
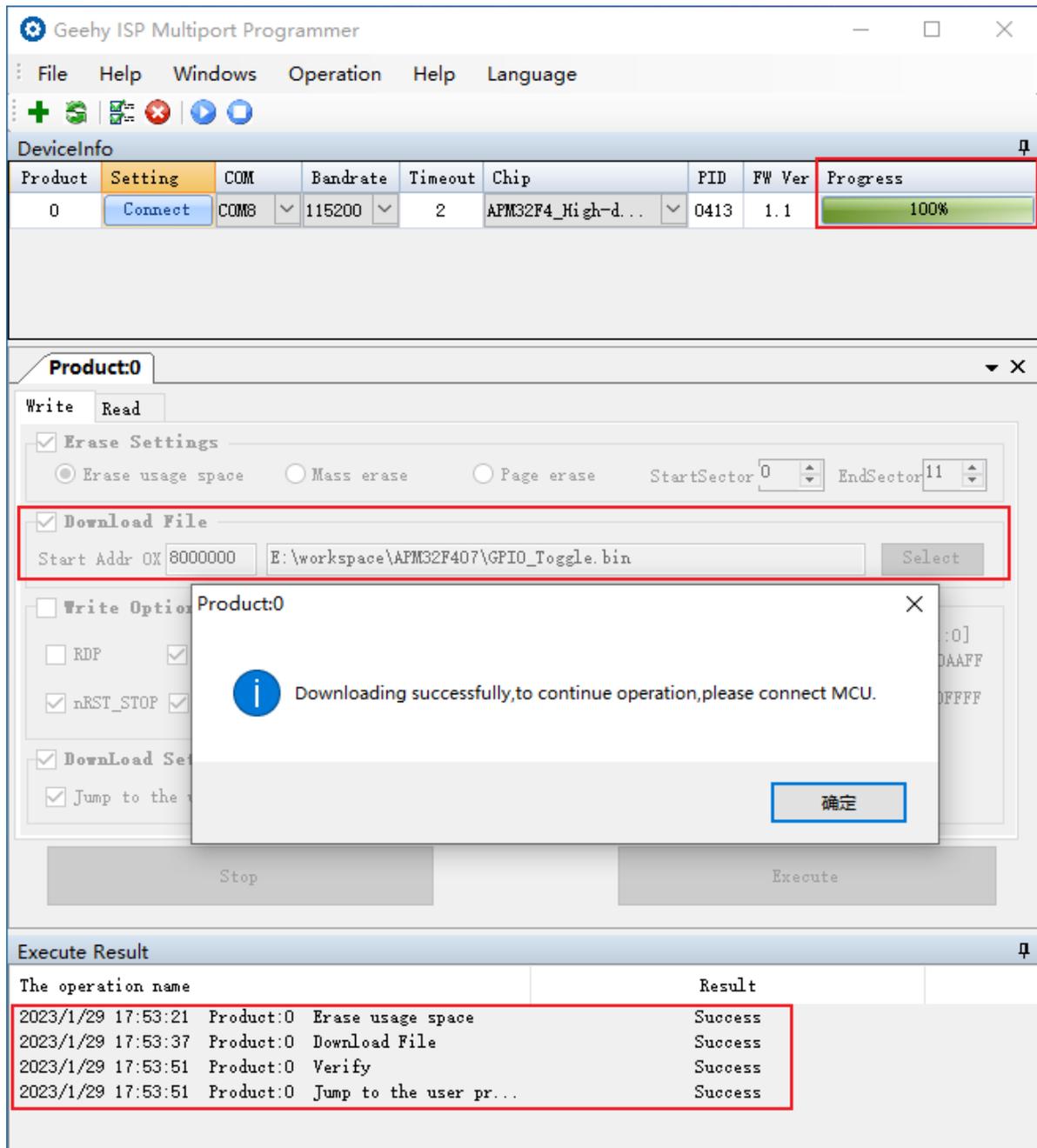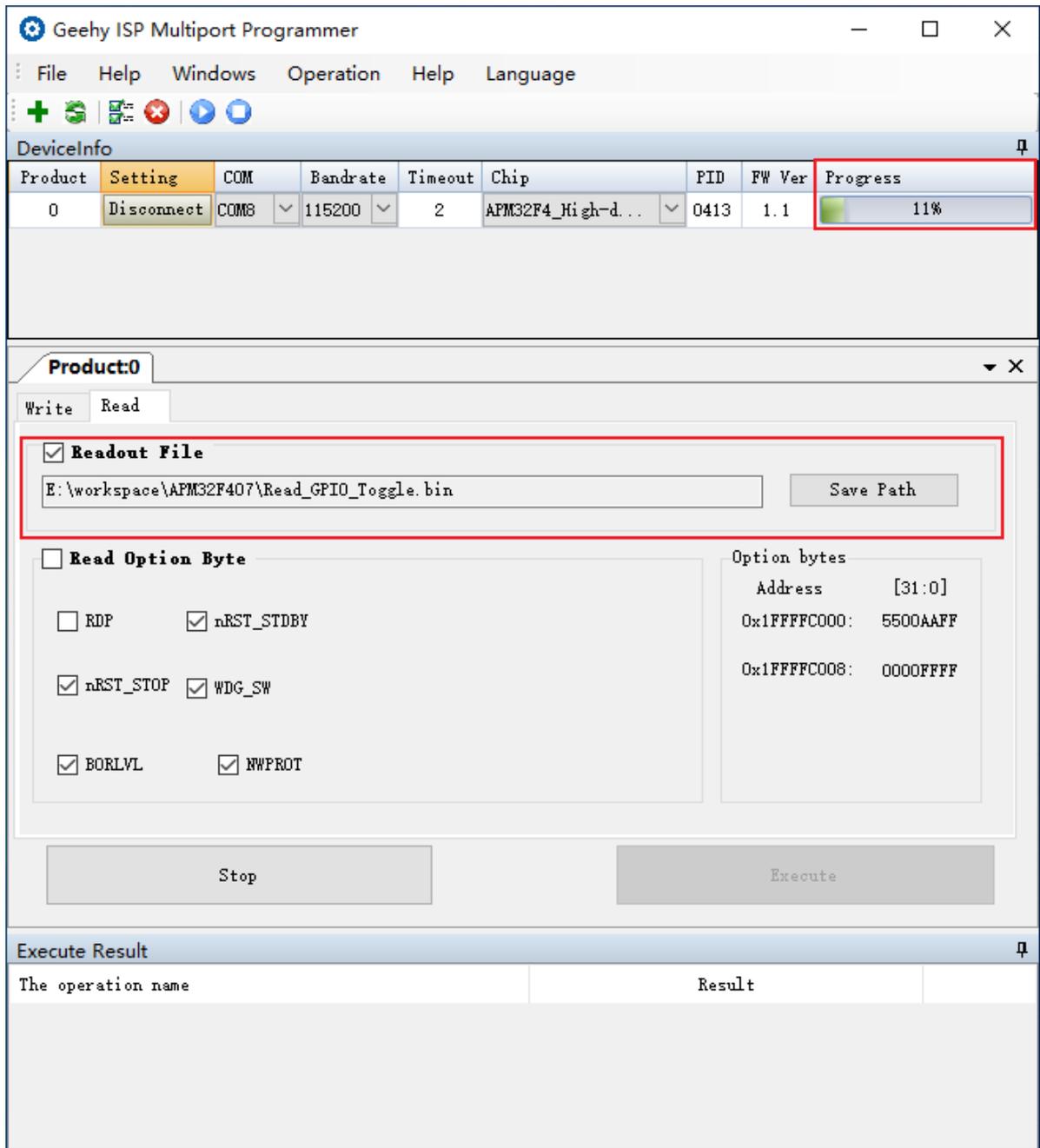
Figure 10 Write to File
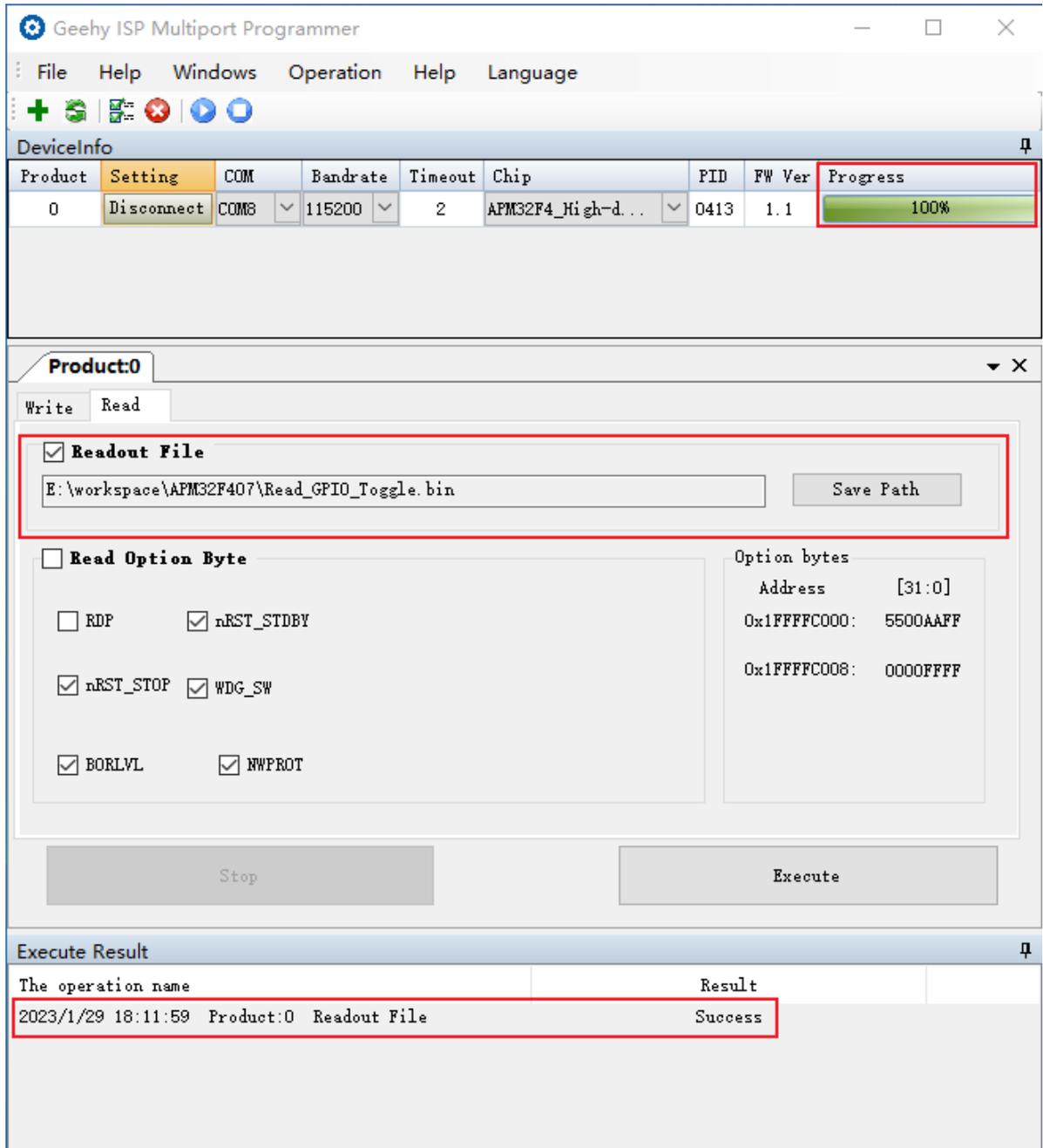
2.4.5　Read a file

Figure 11 Reading a File

Figure 12 Read a File

2.4.6 Execute and abort

1) Execute: After the configuration operation, click "Execute" (or click "Execute all" button on the toolbar) to start communicating with MCU to complete the function selected by the user.

2) Abort: Enable "Abort" (or click "Abort all" button on the toolbar) after starting execution. The following takes "Read a file" as an example to introduce the abort function.
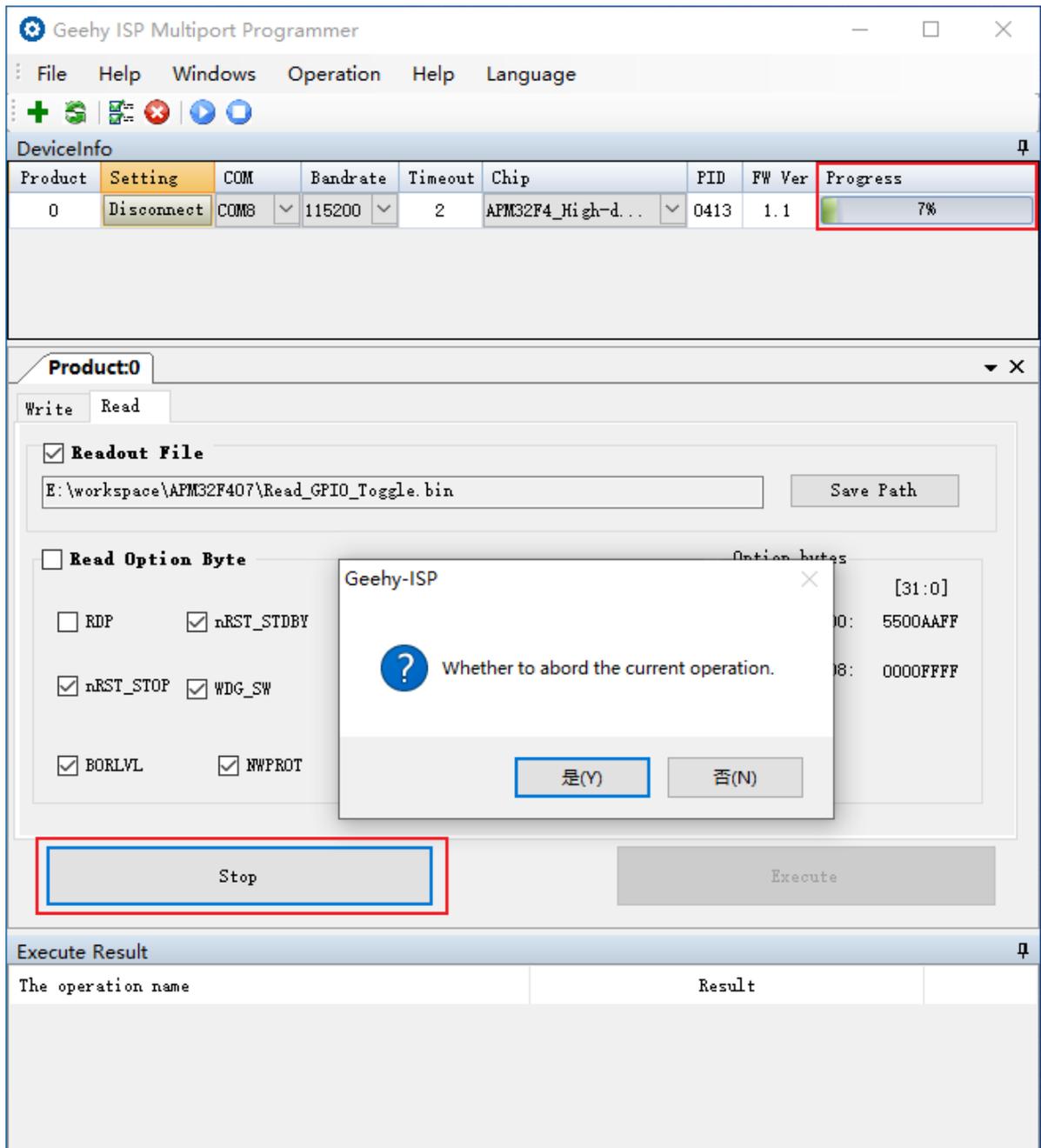
3) Note: After aborting, the operation will fail.

Figure 13 Abort Operation

3 DFU Programmer

The full name of DFU is Device Firmware Upgrade. It mainly supports USB BootLoader, and can implement programming of chip FLASH and modification of option bytes. The function of the software is basically similar to that of APM32 ISP Multiport Programmer, except that it uses USB to upgrade the software of MCU device. This brief summary will use APM32F407IGMINIBOARD to demonstrate the application function of DFU Programmer.

3.1 Environmental requirements

3.1.1 Software requirements

Support of Windows XP, Windows7 and above operating system is required.

Support of .net Framework4.0 is required.

3.1.2 Hardware requirements

Support Type-B, Mini-B, Micro-B and other USB interface types.

3.2 Device operation

3.2.1 Main interface

The main interface of DFU Programmer is divided into four parts, as shown in the following figure:
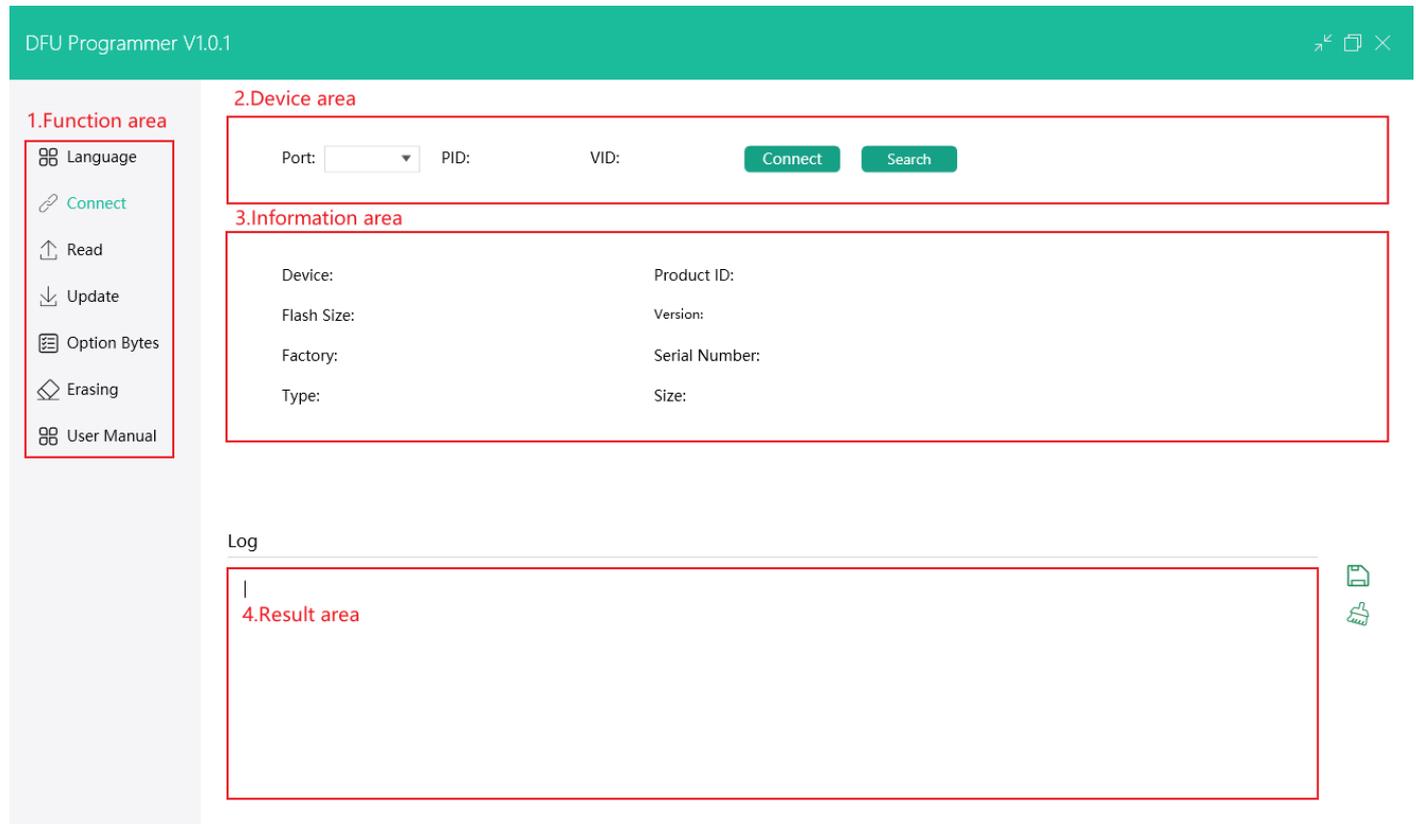

Figure 14 Main Interface

1. **Function area:** This area displays the application functions of the device.

2. **Device area:** This area displays the device information and status.

3. **Information area:** This area displays the basic information of device connection.

4. **Result area:** This area displays the execution of device operation.
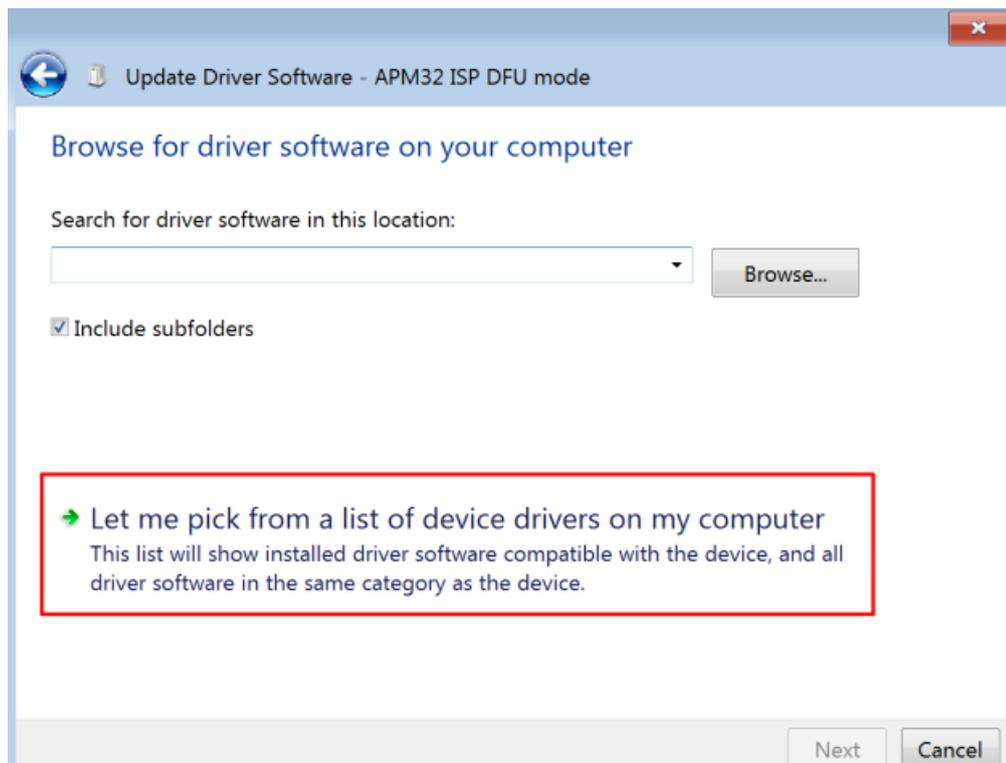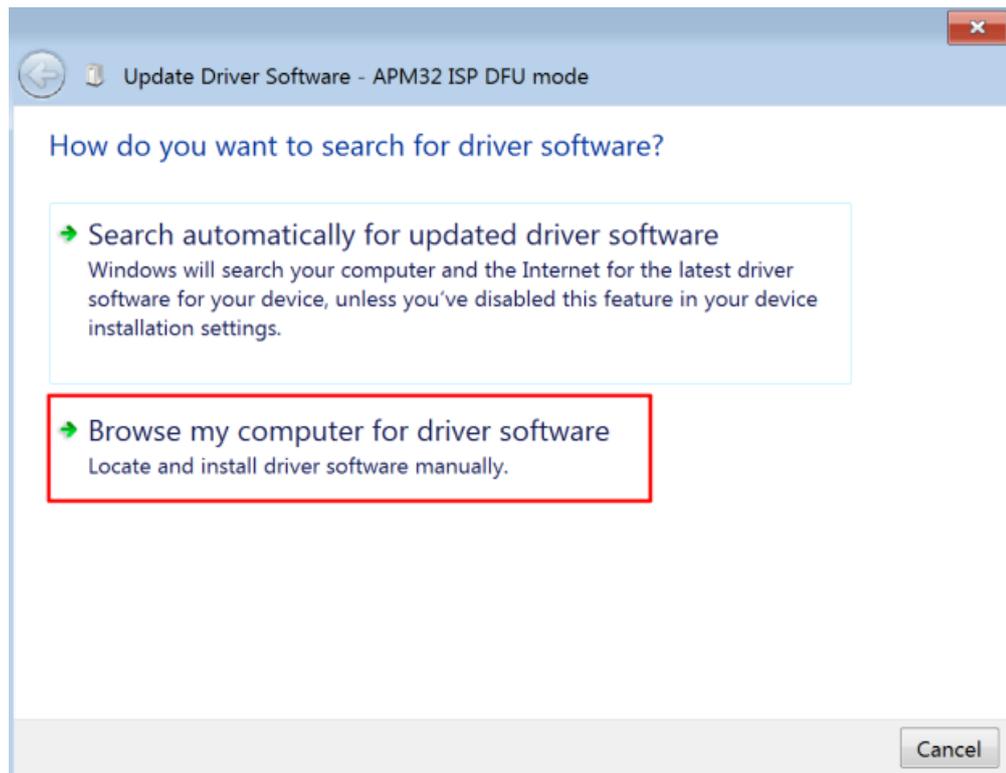
3.2.2 Driver installation

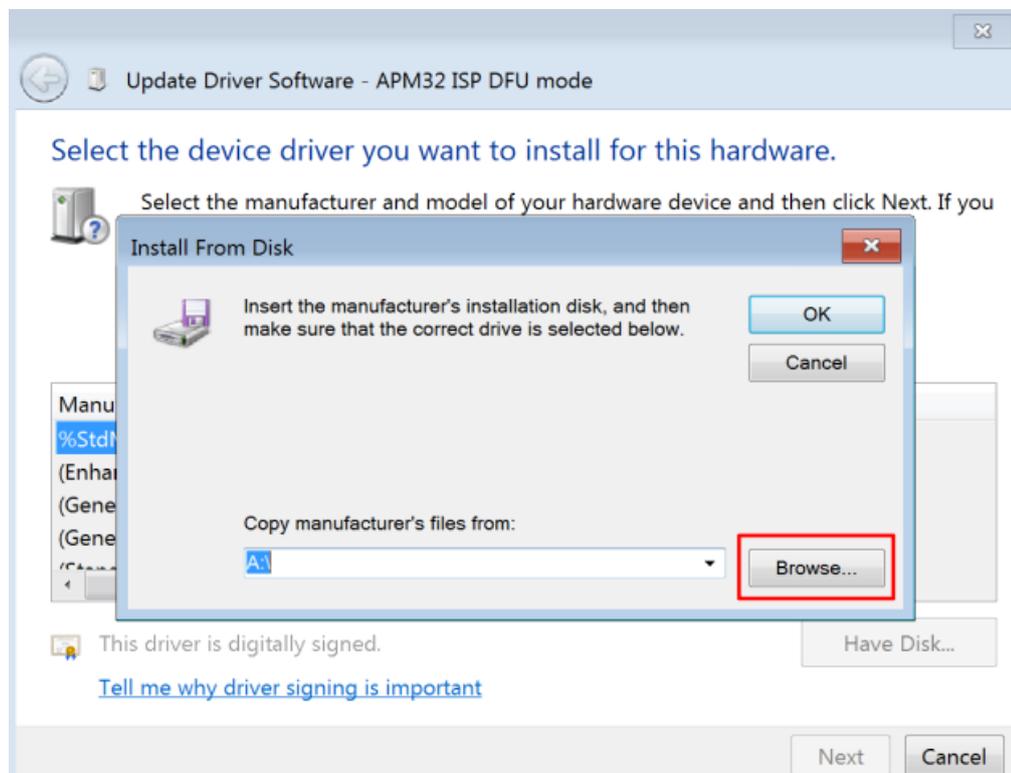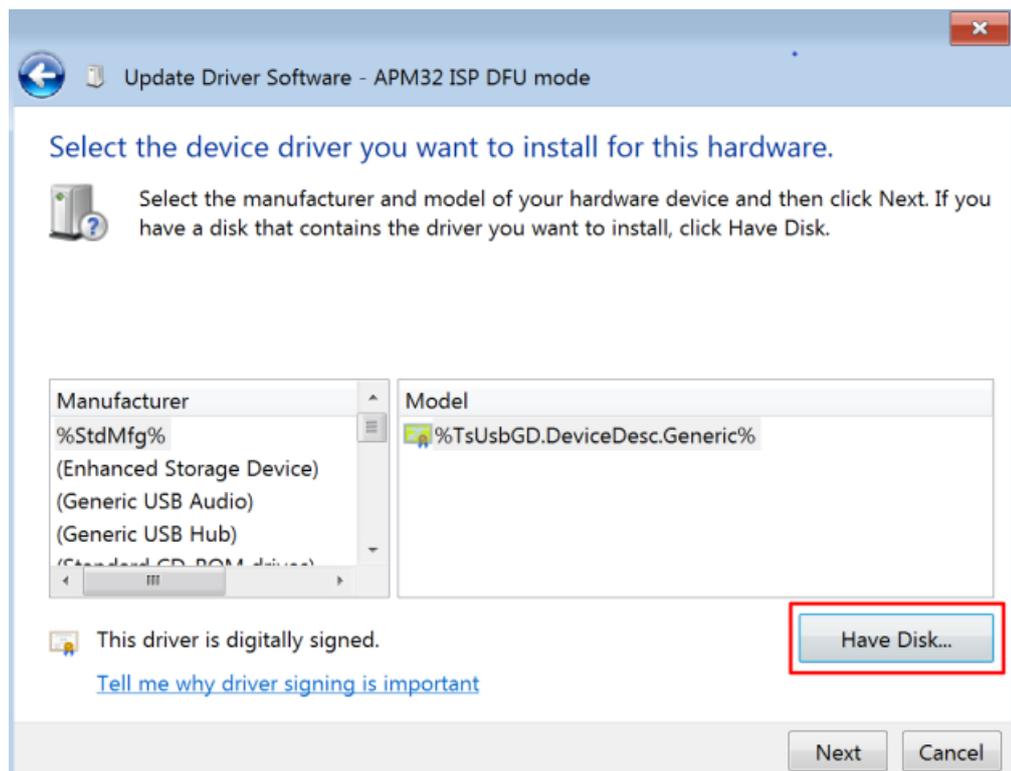1）The administrator opens cmd and enters bcdedit /set testsigning on
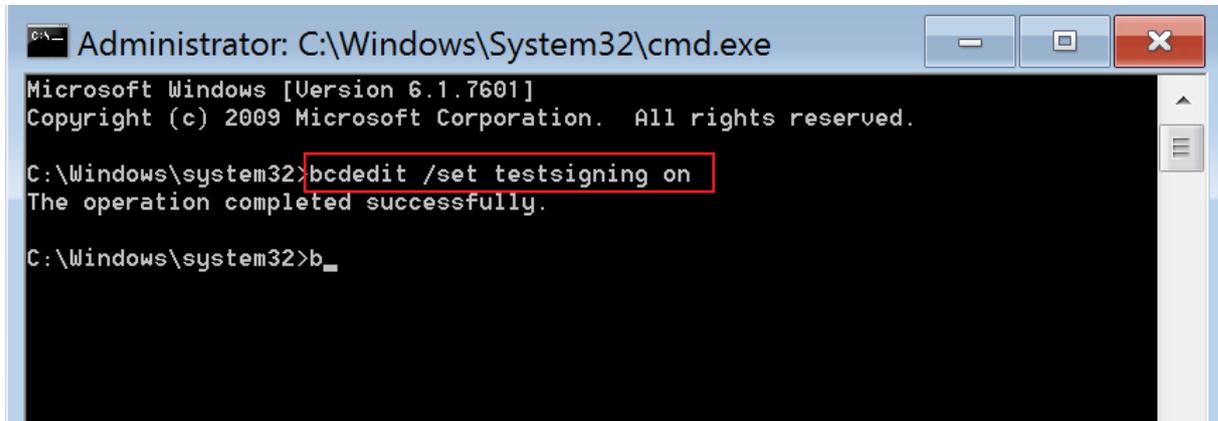
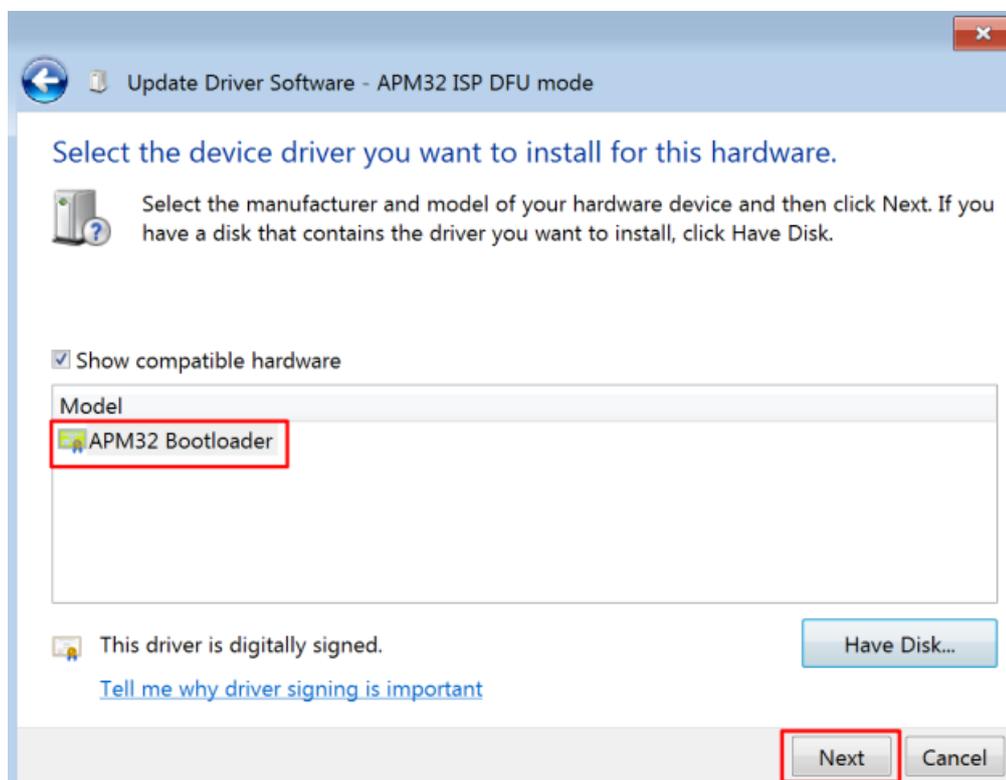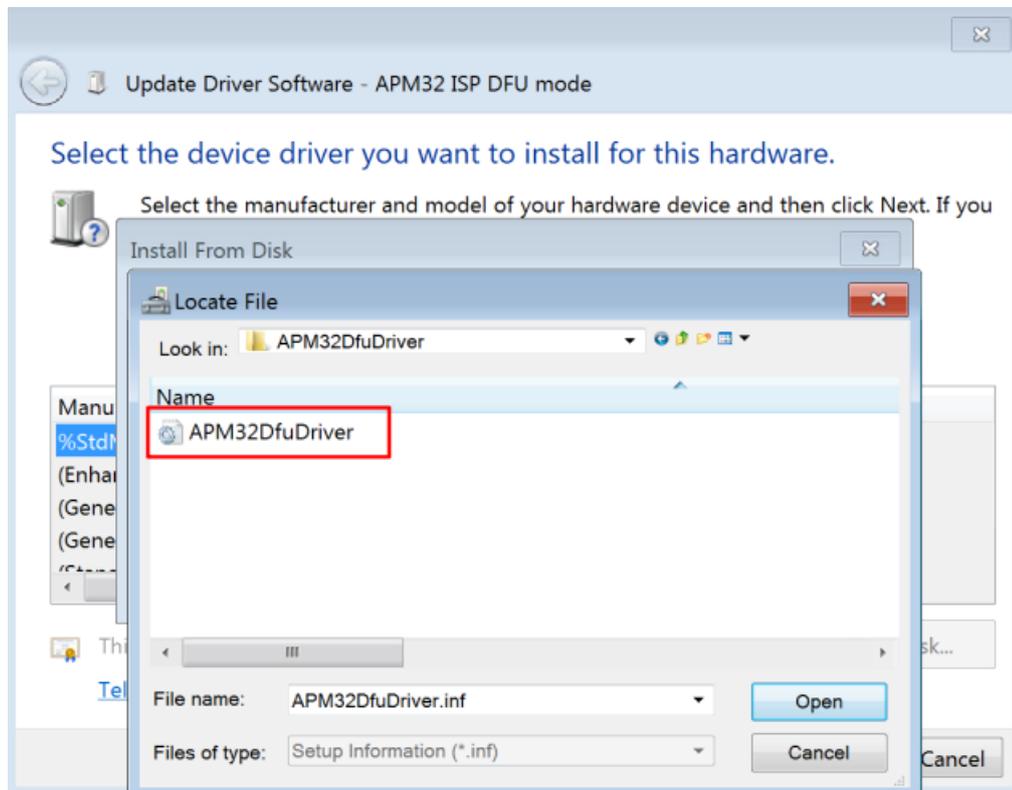2）Insert the device into the computer and check the device manager:
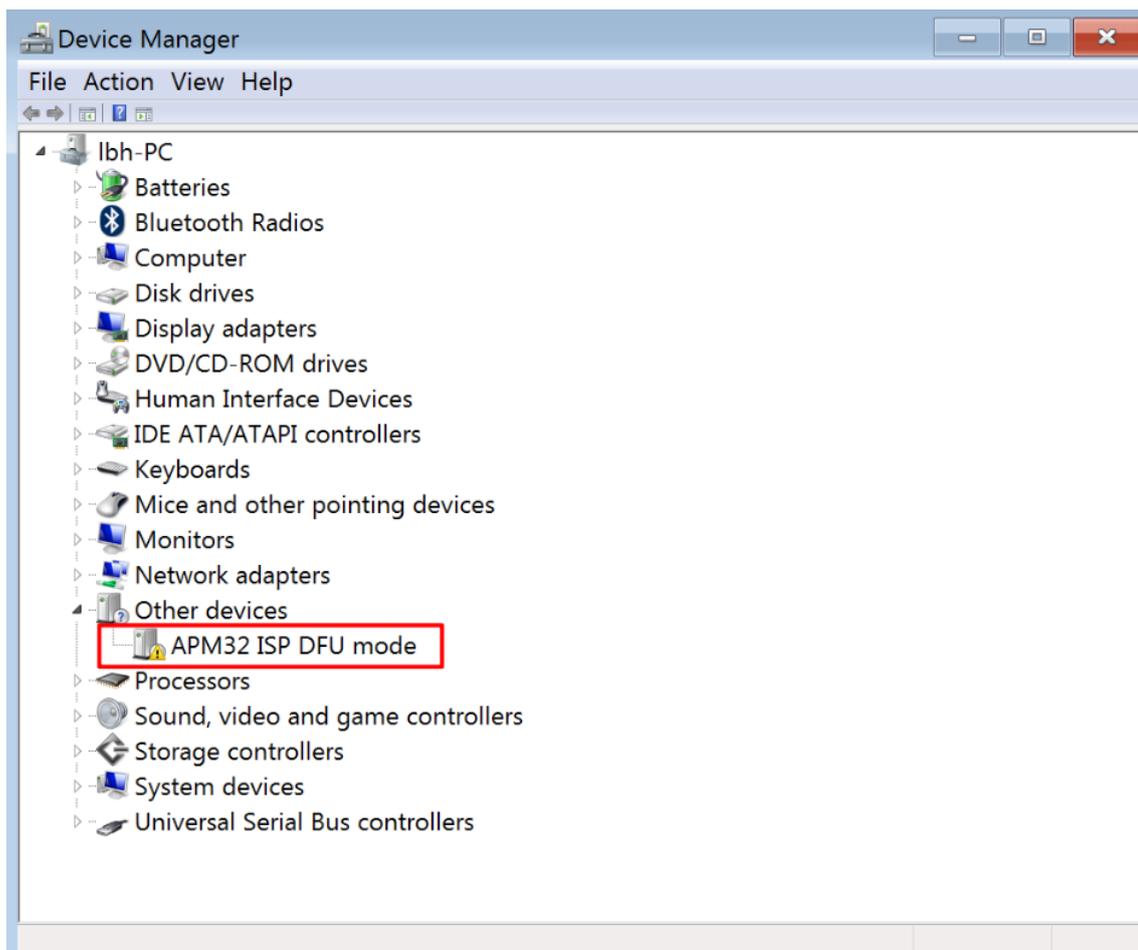
3） Select [Update driver]:

4） Select [Display all devices] next:

5）Select "APM32DfuDriver.inf" driver file:

6）Select [Close] to complete the update of the driver:
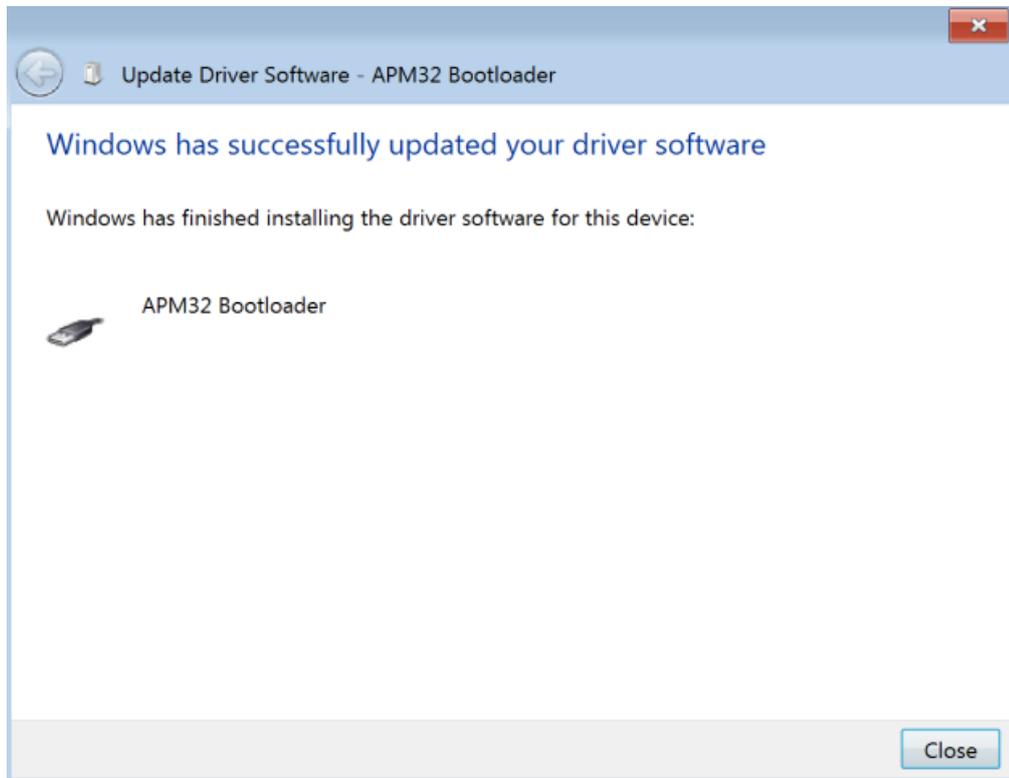
3.3   Function operation

3.3.1   Connect devices

1）According to the device details, select the corresponding device and click [Connect a device] button.

2）When a new device is added, click [Disconnect a device], and then click [Search device] button to find the device and reconnect.
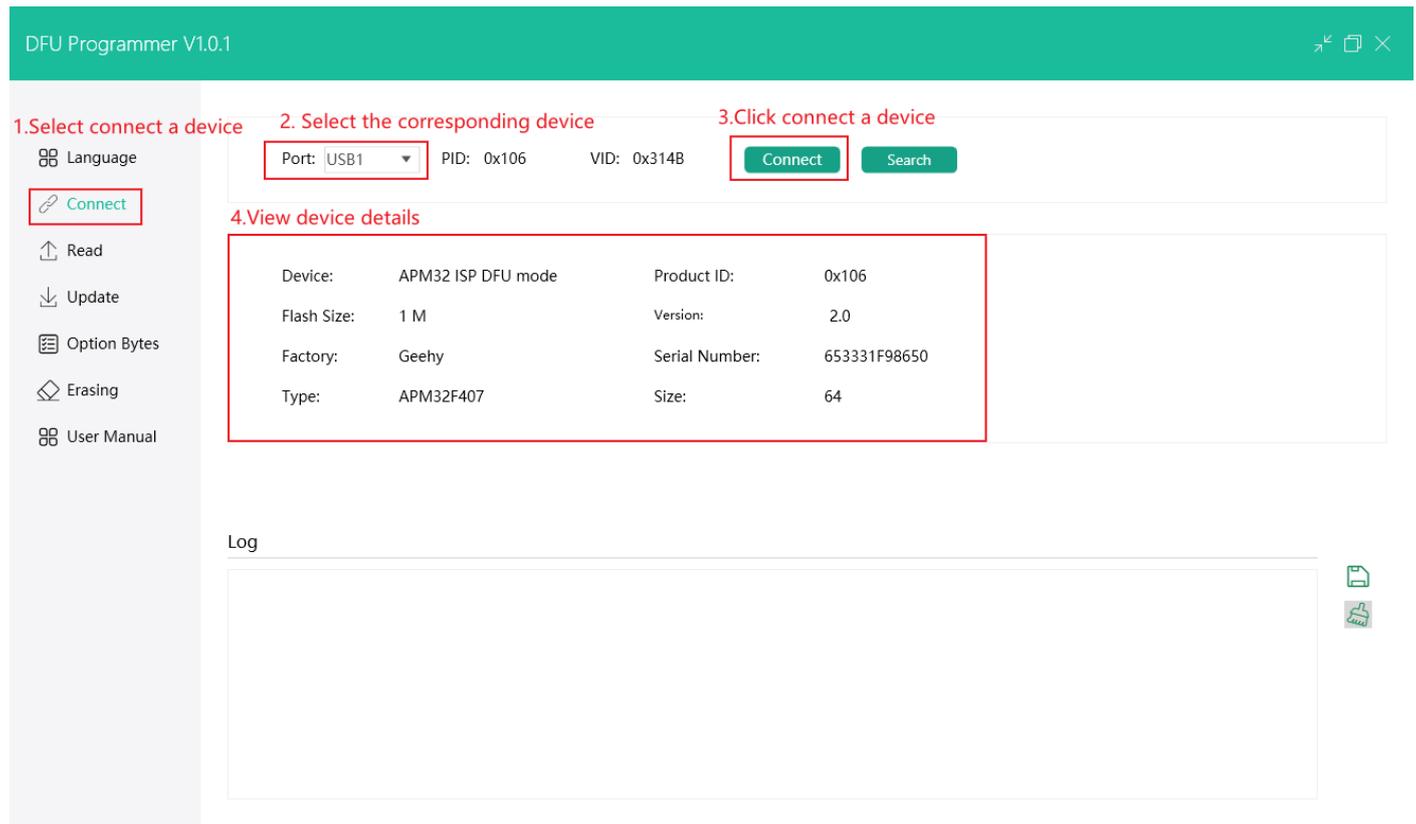

Figure 15 Connect a Device

3.3.2 Read a chip

1） Fill in the star address of chip reading and the size of read data. Click [Read a chip], and the list will display the corresponding read data. There are three data display formats: 8 bits, 16 bits and 32 bits. Click the single choice button to switch.

2） Click [Save data] button to save the read data locally.

Figure 16 Read a Chip

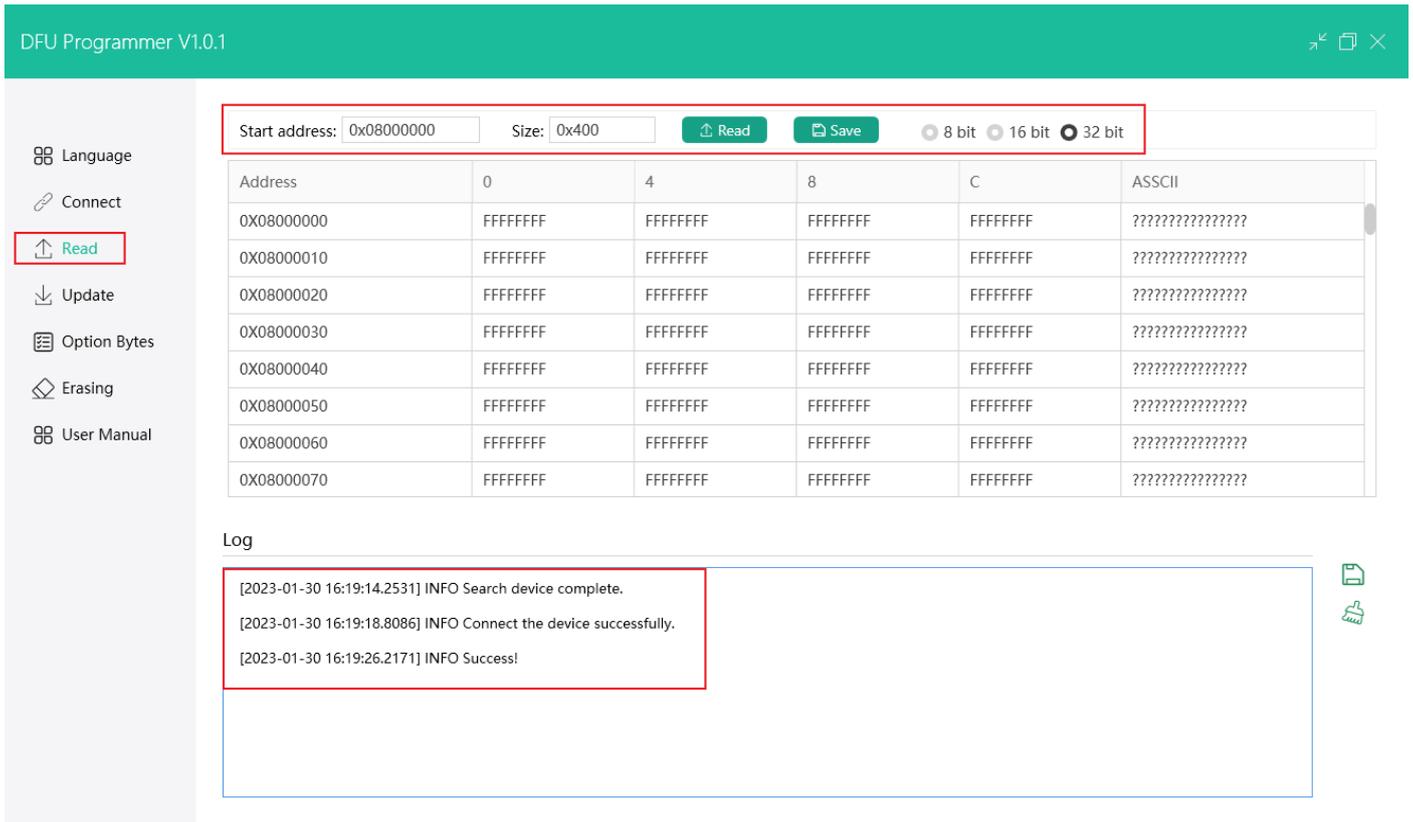### 3.3.3 Firmware upgrade

1）Select the bin file to be written, select the start address of data writing, select the configuration condition, and click Start to update the firmware.

2）Write after erasing the chip: The corresponding sector data will be erased.

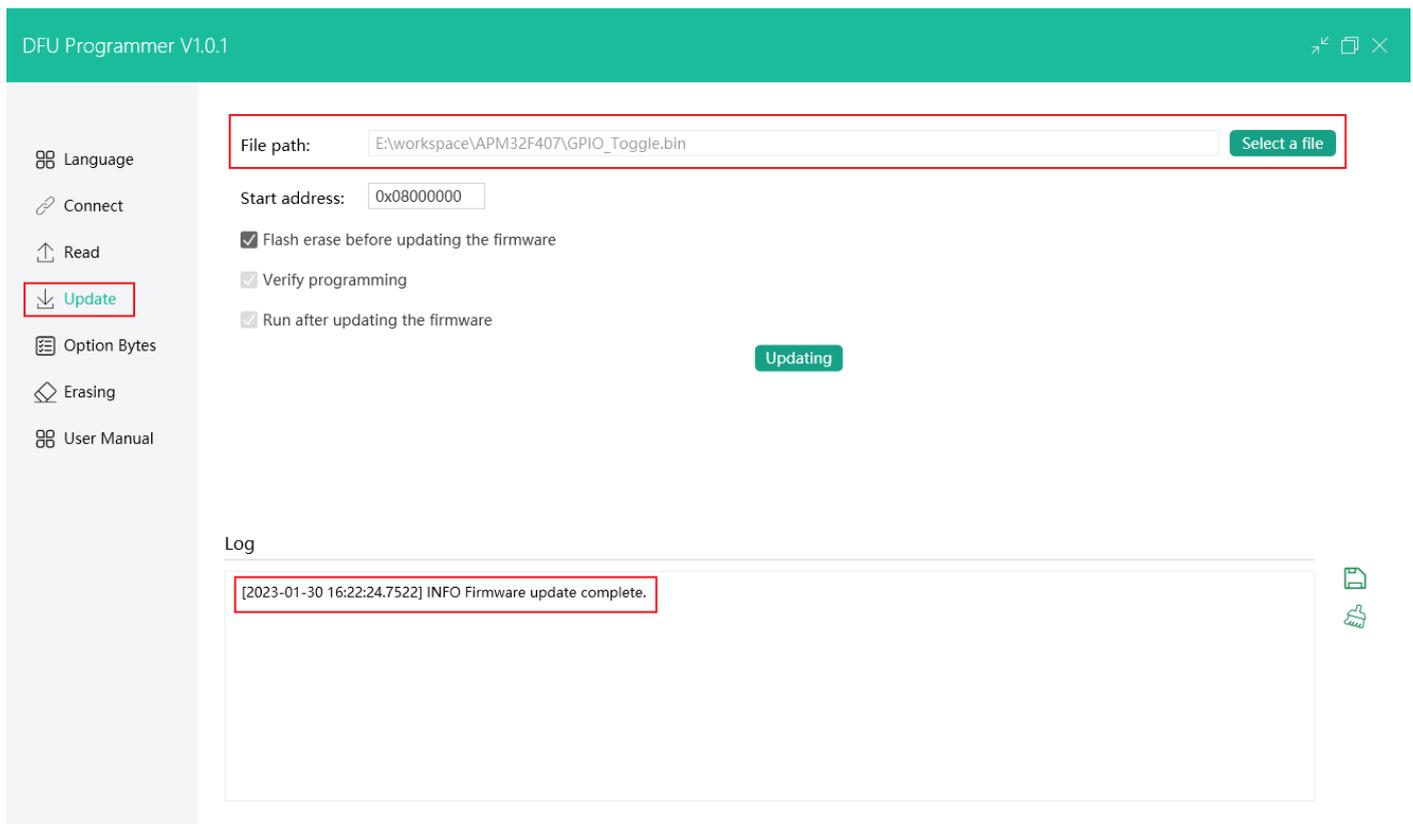3）Run after writing: The program will run after writing, and the chip needs to be manually reset and reconnected.

Figure 17 Firmware Upgrade

3.3.4　Option byte

1）[Read] button is used to read the latest option byte configuration.

2）[Application] button is used to write the latest modification to the chip.

3）[Cancel read protection] button is used to restore to the AA (unprotected) state.

4）[User configuration]: Hover the mouse over the option and you can see the detailed explanation.

Note: When in the read protection state, the user cannot [Read a chip], [Upgrade firmware] and [Erase chip].
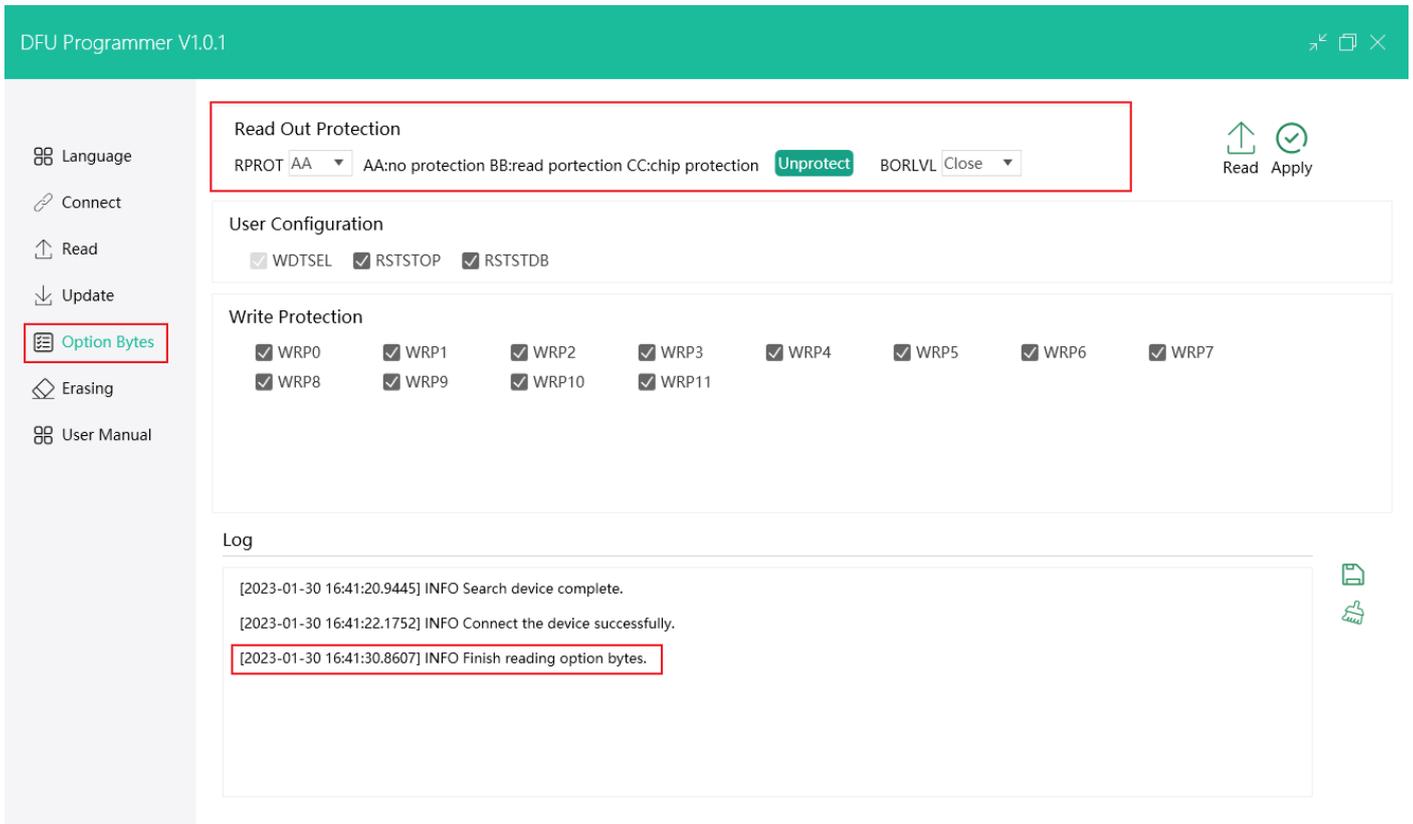
Figure 18 Option Byte

3.3.5 Erase chip

1）[Search address] Enter the address in the search box, and then click Enter to quickly locate the range of the erased sector.

2）[Inverse] Quickly inversely select the address to be erased. The selected address will become unselected, and the unselected address will become selected.

3）[Erase selected] Check the sector to be erased to erase the sector.

4）[Erase all] Erase the entire Flash sector.

4 Revision History

Table 1 Document Revision History

Date	Version	Change History
June 20, 2022	1.0	New

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8. Scope of application

The information in this manual replaces the information provided in all previous versions of the manual.

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